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US 4475715 A US 4386759 A US 4014516 A
US 3908962 A US 3853304 A US 3596878 A

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(54) Installing an aerial cable

(57) A method of installing an aerial cable 44 between two locations A, B having a previously installed aerial cable 10 extending therebetween, includes pulling a pulling rope 22 for the cable 44 from location A to location B with a pulling device 20 moveable along cable 10, whilst supporting the pulling rope 22 from the cable 10 at spaced apart positions therealong as it is pulled to location B with a plurality of interconnected support devices 34 which are pulled from location A with the pulling rope 22 by the pulling device 20. The cable 44 is attached to the pulling rope 22 at location A and pulled thereby to location B through the support devices 34. The cable 44 is fixed or restrained at locations A and B, and the interconnected support devices 34 are pulled to location B and removed from the cables 10, 44 to leave the cable 44 unsupported between said locations.

FIG. 2

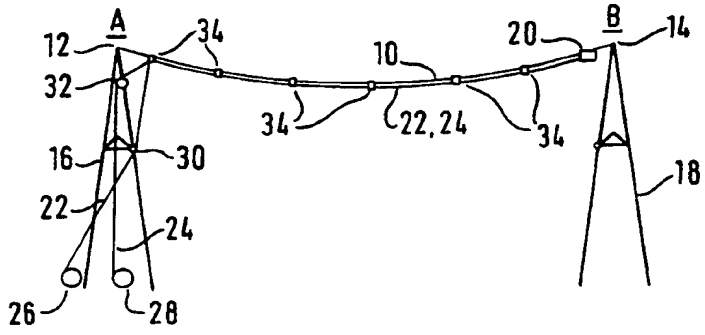
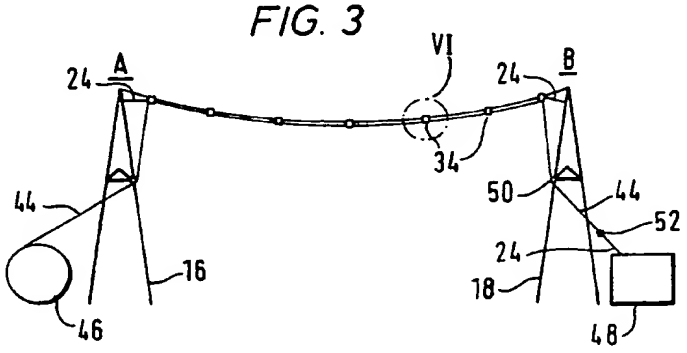


FIG. 3



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

FIG. 1

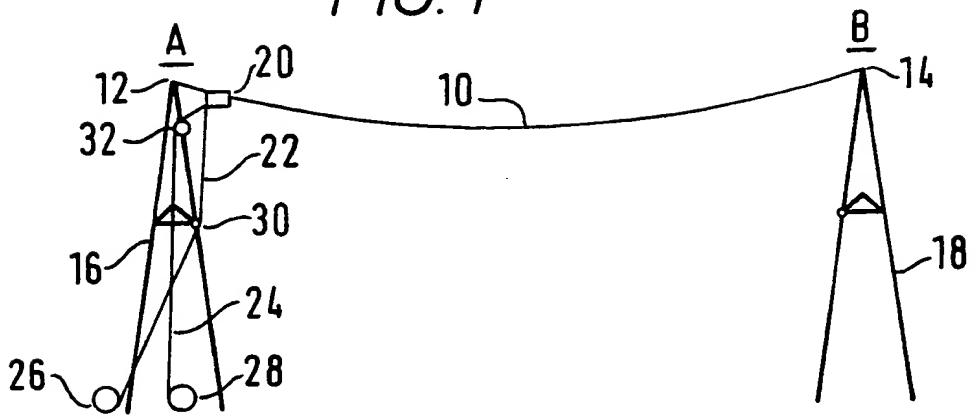


FIG. 2

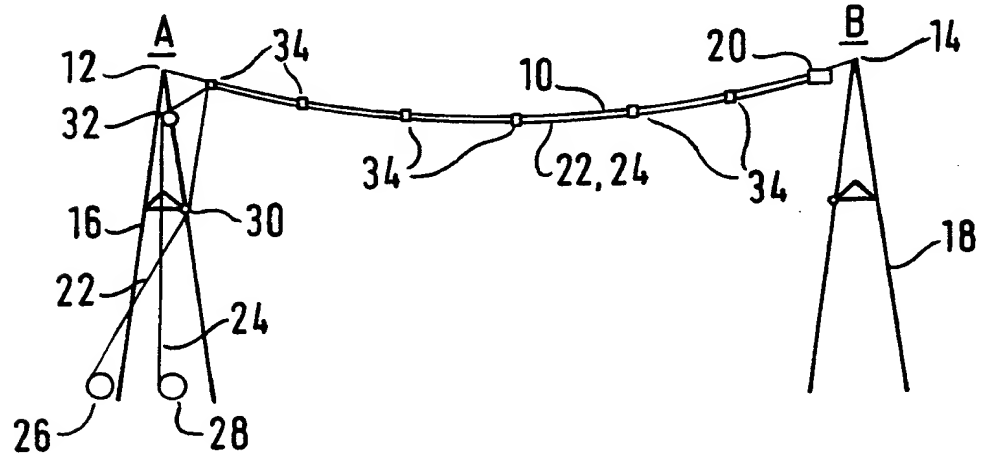


FIG. 3

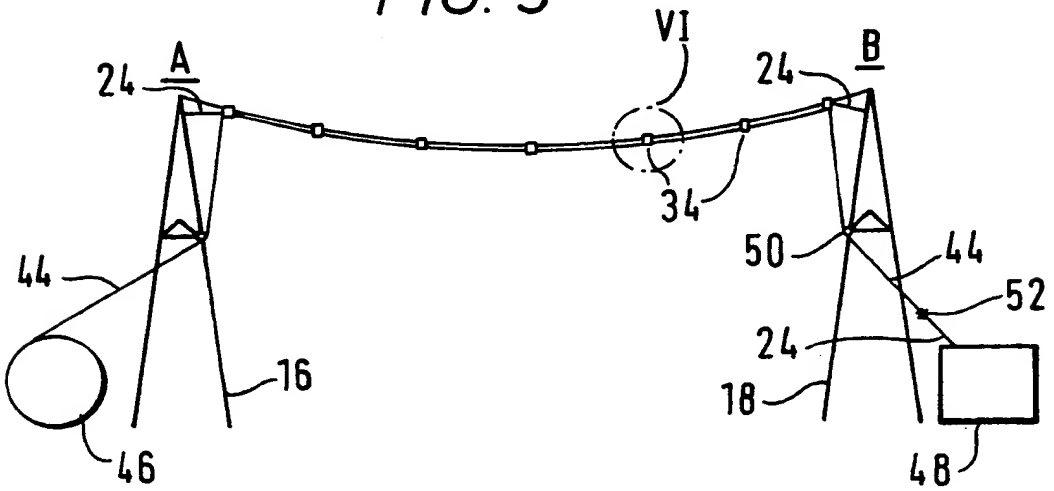


FIG. 4

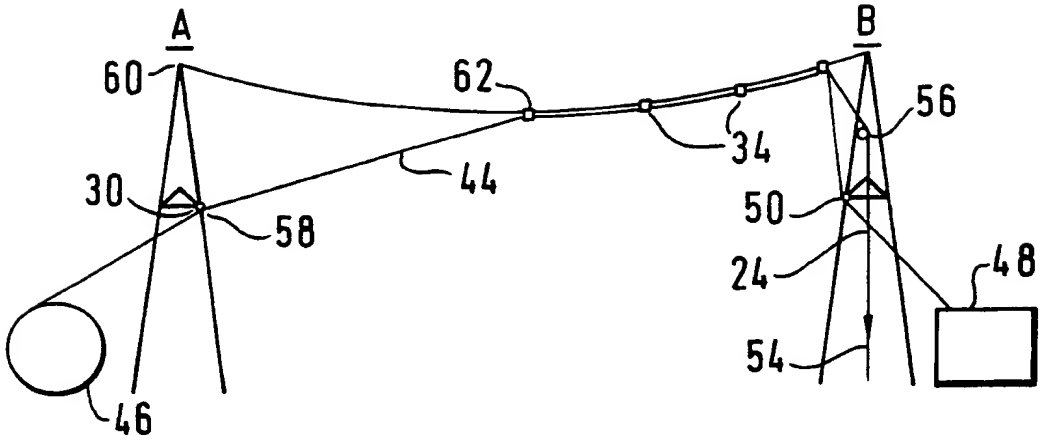


FIG. 5

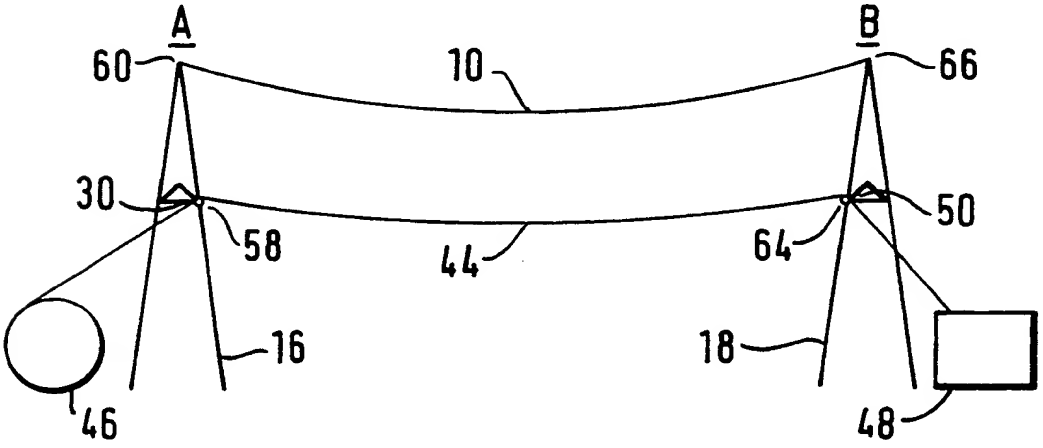
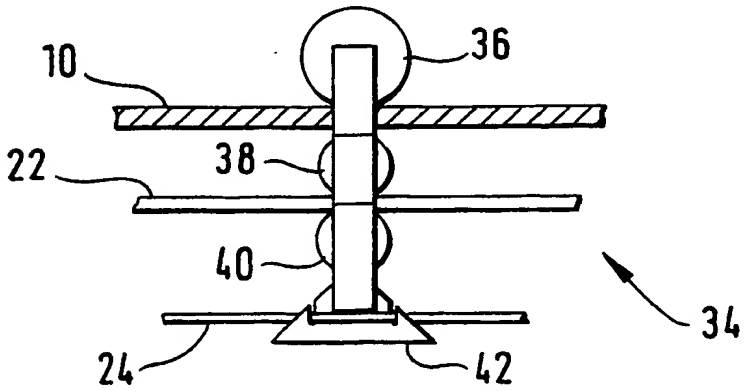


FIG. 6



Installing Aerial Cables

This invention relates to installing aerial cables, and more particularly to installing a second aerial cable between two locations having a previously installed aerial cable extending therebetween.

When an aerial cable is to be installed over an obstruction such as a building, road or river current practice is to install scaffolding over the obstruction or in the case of a road or river to interrupt the traffic flow thereon during installation.

When the aerial cable is an optical cable and there already exists an aerial earthwire of a power transmission system extending between the two locations between which the optical cable is to be installed, it is known to pull the optical cable from one location to the other over the obstruction using a device which runs along the earthwire helically wrapping the optical fibre thereabout. The resulting installation has many disadvantages, for example the need to use longer lengths of optical cable than would otherwise be necessary, the need to remove the optical cable if the earthwire requires replacement, and the ability to use the earthwire only once in such a method.

The present invention has as an object the

provision of a method of installing a second aerial cable between two locations having a previously installed cable making use of that cable, which method does not have the above-mentioned disadvantages.

To this end the invention provides such a method which includes pulling the second cable, or a pulling rope therefor, from a first to the second of said locations with a pulling device locatable on and movable along the previously installed cable, whilst supporting the second cable, or pulling rope therefor, from the previously installed cable at spaced apart positions therealong as it is pulled to said second location with a plurality of interconnected support devices which are pulled from said first location with the second cable, or pulling rope therefor, by the pulling device.

The invention also includes an aerial cable extending between two locations when installed by the method defined in the last preceding paragraph.

When the pulling device pulls a pulling rope for the second cable from the first to the second location, the second cable may be attached to the pulling rope at one of said locations and pulled thereby to the other location through said support devices whereby said second cable is supported from said previously installed cable by said support devices. The method may then further include fixing

or restraining the second cable at said locations, and pulling the interconnected support devices to one or the other of said locations and removing said support devices from the cables at that location to leave the second cable unsupported by said support devices between said locations.

Alternatively, when the pulling device pulls the pulling rope from said first to said second location, the method may include fixing or restraining the pulling rope at said two locations and pulling the interconnected devices to one or the other of said locations and removing said support devices from said pulling rope and previously installed cable at that location to leave the pulling rope unsupported by the support devices between said locations, and thereafter attaching said second cable to said pulling rope adjacent one or the other of said locations and pulling the cable to the remaining location.

If, however, the pulling device pulls the second cable from the first to the second location, the method includes fixing or restraining the second cable at said locations, and pulling the interconnected support devices to one or the other of said locations and removing said support devices from the cables at that location to leave the second cable unsupported by said support devices between said locations.

Each of the methods defined in the last three

preceding paragraphs preferably includes providing a friction device at the end of the interconnected devices remote from said one or the other of said locations at which the interconnected devices are removed and in predetermined frictional engagement with the previously installed cable to maintain the interconnected devices in their relative spaced apart positions as they are pulled to said one or the other of said locations for removal.

The second cable, or pulling rope therefor, may be fixed to, or restrained about, a position at the location adjacent the friction device which position is beneath the position at which said previously installed cable is fixed at that location, such that as said interconnected devices are pulled to the location at which they are removed, the second cable, or pulling rope, is lowered relative to said previously installed cable.

The method may include fixing the second cable, or pulling rope therefor, at the location at which the interconnected devices are removed at a position which is beneath the position at which the previously installed cable is fixed at that location.

The friction device used in the method may comprise a pulley wheel engageable with the previously installed cable and provided with rotation braking means, and said method may then further include the

step of setting said braking means such that said pulley wheel is in said predetermined frictional engagement with said previously installed cable.

Each of the interconnected devices used in the method may comprise a pulley engageable with the previously installed cable and support means for supporting the second cable, or pulling rope therefor, beneath said pulley, and said method may then further include engaging the pulley of each device with the previously installed cable and supporting the second cable, or pulling rope therefor, beneath the pulley in the support means associated therewith at said first location as said interconnected devices are pulled therefrom towards said second location.

The method may include successively interconnecting said devices to an interconnecting rope means as they are engaged with said previously installed cable at said first location.

The pulling device used in the method is preferably self-propelling.

For the avoidance of doubt whilst the method is particularly applicable to installing a cable comprising optical fibres it is not so limited and may be used for installing other types of cables. Furthermore since the previously installed cable is used only in the performance of the method it is not essential for that cable to be an earthwire. For

example, it may instead be a phase conductor which is de-energised during the performance of the method.

The invention also includes a support device for use in installing a second aerial cable between two locations having a previously installed cable extending therebetween, said device comprising a pulley for engagement with the previously installed cable, support means for supporting the second cable, or a pulling rope therefor, beneath the pulley when the pulley is positioned to run along the previously installed cable above the same, and means for attaching said device to rope means whereby a plurality of said devices can be interconnected for pulling at spaced apart locations along the length of said previously installed cable.

In order that the invention may be well understood, an embodiment thereof which is given by way of example only will now be described with reference to the accompanying drawings, in which:

Figures 1 to 5 schematically illustrate successive steps of a method of installing an aerial optical cable between two locations having a previously installed aerial cable extending therebetween; and

Figure 6 is an enlarged view of detail VI in Figure 3 showing a support device used in the method.

Referring first to Figure 1, there is shown a

previously installed aerial cable 10 extending between two locations A and B and fixed respectively at elevated positions 12 and 14 at these locations on respective towers 16 and 18. Other cables may be similarly installed but only cable 10 is illustrated for simplicity. Cable 10 is an earthwire or a de-energised electric conductor.

The method utilises a remotely controllable, self-propelling pulling device 20 which is locatable on the cable 10 as illustrated in the figures and moveable along the cable under its own power. It is not necessary to know the details of the construction of the pulling device 20 to understand the method.

The pulling device 20 is located on the cable 10 adjacent the tower 16 at location A and has attached to it the free ends of respective ropes 22 and 24 which are drawn from respective reels 26 and 28 about respective pulleys 30 and 32 mounted on the tower 16. The rope 22 is a pulling rope for the aerial cable to be installed and the rope 24 is a rope for interconnecting a plurality of support devices 34 which are used in the method for supporting the pulling rope 22, and subsequently the aerial cable to be installed, from the cable 10.

The pulling device 20 is moved a predetermined distance, say 5 metres, along the cable 10 from the location A and the first of said support devices 34 is

fitted at location A. As illustrated in Figure 6, each support device 34 comprises a pulley 36 engageable with the cable 10 for running along that cable above the same, a support means shown as two pulleys 38, 40 for supporting the pulley rope 22, and subsequently the aerial cable to be installed, beneath the pulley 36 and the cable 10, and an interconnection means 42 for attaching the device 34 to the rope 24. As illustrated, the interconnection means comprises a slotted member through which the rope 24 is woven such that the rope 24 is fixedly secured to the device 34.

Thereafter, the pulling device 20 is moved a further predetermined distance, say 15 metres, along the cable and a second support device 34 is fitted at location A to the cable 10 and ropes 22 and 24.

The remaining devices 34 are successively fitted to the cable 10 and ropes 22 and 24 at location A as the pulling device 20 is moved along the cable 10 in steps of say 15 metres until the pulling device reaches location B as illustrated in Figure 2. As will be appreciated, the pulling rope 22 is supported from the cable 10 at spaced apart intervals along the cable 10 as it is pulled to location B by the support devices 34 which are interconnected by rope 24 as those support devices 34 and the rope 22 are pulled from the location A by the pulling device 20.

When the pulling device has reached location B,

the pulling rope is supported from the cable 10 by the devices 34 across the span between the locations A and B as shown in Figure 2.

The rope 24 interconnecting the support devices 34 is secured to the towers 16 and 18 to retain the support devices 34 at their spaced apart positions along the cable 10 and the aerial cable to be installed is attached to the pulling rope 22 at one of the locations A, B and pulled thereby to the other location through the support devices. In the embodiment, as shown in Figure 3 the cable to be installed comprises an optical cable 44, that is a cable comprising optical fibres, which is pulled from a braked drum 46 at location A around pulley 30 and between the pulleys 38 and 40 of each device 34 to location B by a winch 48 at location B. During this pulling operation the pulling rope 22 and the cable 44 attached thereto are guided around a pulley 50 fixed to the tower 18 at location B.

The optical cable 44 is thus supported from the cable 10 by the devices 34 as shown in Figure 3 where the connection between the cable 44 and the pulling rope is indicated at 52.

Whilst the cable 44 is fixed or restrained at the locations A, B the devices 34 interconnected by rope 24 are pulled to one of those locations (after release of the rope at the other location) and removed from

the cables 10 and 44 at that location to leave the cable unsupported by the support devices 34 between the locations A, B. As shown in Figure 4, in the embodiment, the rope 24 is released from tower 16 and pulled from location B, as indicated by arrow 54, around a pulley 56 mounted on tower 18. The devices are pulled to and removed at, location B in this way after the cable 44 has been fixed to the tower 16 adjacent pulley 30 at a position 58 which is beneath the position 60 at which the cable 10 is fixed to the tower 16 at location A.

A friction device 62 is fitted at the end of the interconnected devices 34 remote from location B in predetermined frictional engagement with the cable 10 to maintain the devices in their relative spaced apart positions as they are pulled to location B for removal. In this way as illustrated in Figure 4 the cable is lowered gradually relative to the cable 10 as the devices 34 are pulled to location B. The friction device 62 may take any form which can provide a predetermined frictional engagement with the cable and for example may comprise a pulley wheel engageable with the cable 10 and provided with rotation braking means which can be set such that the pulley wheel is in the required predetermined frictional engagement with the cable.

Whilst the support devices 34 are being pulled to

and removed at location B, the cable 44 is restrained at location B to prevent it sagging lower than required between the two locations. As illustrated in Figure 4, the cable is retained taut using the winch 48 during this step.

As illustrated in Figure 5 the cable is fixed to the tower 18 adjacent the pulley 50 at a position 64 which is beneath the position 66 at which the cable 10 is fixed to the tower 18 at location B.

It will be appreciated that the above-described method enables installation of the aerial cable 44 between the two locations A and B which would avoid the need for constructing scaffolding over any obstruction between those locations or interrupting traffic flow in the case of the obstruction being a road or river. Further, whilst the method utilises a previously installed cable extending between the two locations during the installation method, there is no interdependence between the two cables following installation.

It will be appreciated that the pulling rope 22 is used in the embodiment since it can be lighter than the cable to be installed and accordingly easier to be pulled from the first to the second location by the self-propelling pulling device 20. However, if the pulling device 20 were capable of pulling the cable 44 between the locations, the described embodiment could

be modified, and the cable 44 pulled from the first to the second location by the pulling device 20. In this case, of course, the cable 44 would be supported from the cable 10 as it is pulled to the second location B with the interconnected devices 34 which would be pulled from the first location A with the cable 44.

It is also envisaged that the embodiment could be modified to omit the step of attaching the cable 44 to the pulling rope 22 and pulling it through the devices from the first location A to the second location B such that the pulling rope 22 rather than the cable 44 is installed between the two locations fixed to the towers and unsupported by the devices (in a similar condition as illustrated in Figure 5 for the cable 44). In this case the cable to be installed would subsequently be attached to the pulling rope 22 at one of the locations A, B and pulled across therewith to the other location.

CLAIMS:

1. A method of installing a second aerial cable between two locations having a previously installed aerial cable extending therebetween, including pulling the second cable, or a pulling rope therefor, from a first to the second of said location with a pulling device locatable on and movable along the previously installed cable, whilst supporting the second cable, or pulling rope therefor, from the previously installed cable at spaced apart positions therealong as it is pulled to said second location with a plurality of interconnected support devices which are pulled from said first location with the second cable, or pulling rope therefor, by the pulling device.

2. A method as claimed in claim 1, wherein said pulling device pulls a pulling rope for the second cable from said first to said second location and said second cable is attached to said pulling rope at one of said locations and pulled thereby to the other location through said support devices whereby said second cable is supported from said previously installed cable by said support devices.

3. A method as claimed in claim 2, including fixing

or restraining the second cable at said locations, and pulling the interconnected support devices to one or the other of said locations and removing said support devices from the cables at that location to leave the second cable unsupported by said support devices between said locations.

4. A method as claimed in claim 1, wherein said pulling device pulls a pulling rope from said first to said second location, and including fixing or restraining the pulling rope at said two locations and pulling the interconnected devices to one or the other of said locations and removing said support devices from said pulling rope and previously installed cable at that location to leave the pulling rope unsupported by the support devices between said locations, and thereafter attaching said second cable to said pulling rope adjacent one or the other of said locations and pulling the cable to the remaining location.

5. A method as claimed in claim 1, wherein said pulling device pulls the second cable from said first to said second location, and including fixing or restraining the second cable at said locations, and pulling the interconnected support devices to one or the other of said locations and removing said support

devices from the cables at that location to leave the second cable unsupported by said support devices between said locations.

6. A method as claimed in claim 3, 4 or 5, including providing a friction device at the end of the interconnected devices remote from said one or the other of said locations at which the interconnected devices are removed and in predetermined frictional engagement with the previously installed cable to maintain the interconnected devices in their relative spaced apart positions as they are pulled to said one or the other of said locations for removal.

7. A method as claimed in claim 6, wherein the second cable, or pulling rope therefor, is fixed to, or restrained about, a position at the location adjacent the friction device which position is beneath the position at which said previously installed cable is fixed at that location, such that as said interconnected devices are pulled to the location at which they are removed, the second cable, or pulling rope, is lowered relative to said previously installed cable.

8. A method as claimed in claim 7, including fixing

the second cable, or pulling rope therefor, at the location at which the interconnected devices are removed at a position which is beneath the position at which the previously installed cable is fixed at that location.

9. A method as claimed in claim 6, 7 or 8, wherein said friction device comprises a pulley wheel engageable with the previously installed cable and provided with rotation braking means, and said method further includes the step of setting said braking means such that said pulley wheel is in said predetermined frictional engagement with said previously installed cable.

10. A method as claimed in any one of the preceding claims, wherein each of said interconnected devices comprises a pulley engageable with the previously installed cable and support means for supporting the second cable, or pulling rope therefor, beneath said pulley, and wherein said method further includes engaging the pulley of each device with the previously installed cable and supporting the second cable, or pulling rope therefor, beneath the pulley in the support means associated therewith at said first location as said interconnected devices are pulled

therefrom towards said second location.

11. A method as claimed in claim 10, including successively interconnecting said devices to an interconnecting rope means as they are engaged with said previously installed cable at said first location.

12. A method as claimed in any one of the preceding claims, wherein said pulling device is self-propelling.

13. A method as claimed in any one of the preceding claims, wherein said second cable comprises optical fibres.

14. A method as claimed in any one of the preceding claims, wherein said previously installed cable is an earth wire or a phase conductor which is de-energised.

15. A method of installing an aerial cable, substantially as hereinbefore described with reference to the accompanying drawings.

16. An installation comprising an aerial cable extending between two locations when installed by a

method as claimed in any one of the preceding claims.

17. A support device for use in installing a second aerial cable between two locations having a previously installed cable extending therebetween, said device comprising a pulley for engagement with the previously installed cable, support means for supporting the second cable, or a pulling rope therefor, beneath the pulley when the pulley is positioned to run along the previously installed cable above the same, and means for attaching said device to rope means whereby a plurality of said devices can be interconnected for pulling at spaced apart locations along the length of said previously installed cable.

18. A support device for use in a method as claimed in any one of claims 1 to 12 and substantially as herein described with reference to Fig. 6 of the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

Application number
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Relevant Technical Fields

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(ii) Int Cl (Ed.5) H02G (1/02, 1/04)

Search Examiner
MR J L FREEMAN

Date of completion of Search
29 OCTOBER 1993

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
1 TO 18

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	US 4475715	(W A ASPLIN) All Figures	1 and 17
X	US 4386759	(M D GROVER & G B MOORE) Figure 1	1 and 17
X	US 4014516	(K R JACKS) Figure 1	1 and 17
X	US 3908962	(A W ROSS) Figures 1 to 3	1 and 17
X	US 3853304	(R L JACKSON) Figures 1 to 6	1 and 17
X	US 3596878	(E M PARSEN) Figure 1	1 and 17

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